VICTORIAN ENTOMOLOGIST

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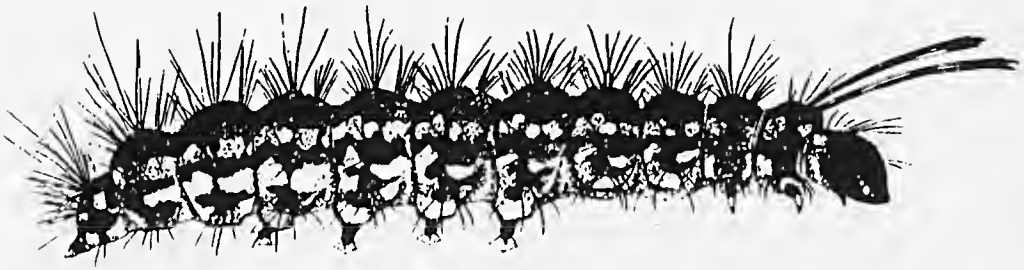

News Bulletin of The Entomological Society of Victoria Inc.

THE ENTOMOLOGICAL SOCIETY OF VICTORIA (Inc)
MEMBERSHIP

Any person with an interest in entomology shall be eligible for Ordinary membership. Members of the Society include professional, amateur and student entomologists, all of whom receive the Society's News Bulletin, the Victorian Entomologist.

OBJECTIVES

The aims of the Society are:

(a) to stimulate the scientific study and discussion of all aspects of entomology,
(b) to gather, disseminate and record knowledge of all identifiable Australian insect species,
(c) to compile a comprehensive list of all Victorian insect species,
(d) to bring together in a congenial but scientific atmosphere all persons interested in entomology.

MEETINGS

The Society's meetings are held at Clunies Ross House, National Science Centre, 191 Royal Parade, Parkville, Victoria, at 8 p.m. on the third Friday of even months, with the possible exception of the December meeting which may be held earlier. Lectures by guest speakers or members are a feature of many meetings at which there is ample opportunity for informal discussion between members with similar interests. Forums are also conducted by members on their own particular interest so that others may participate in discussions.

SUBSCRIPTIONS

Ordinary Member	$20.00
Country Member	$16.00 (Over 100 km from GPO Melbourne)
Student Member	$12.00
Associate Member	$ 5.00 (No News Bulletin)

No additional fee is payable for overseas posting by surface mail of the news bulletin. Associate Members, resident at the same address as, and being immediate relatives of an ordinary Member, do not automatically receive the Society's publications but in all other respects rank as ordinary Members.

Cover design by Alan Hyman.

Cover illustration of Magpie Moth or Senecio Moth, *Nyctemera amica* by Cait Symington.

MINUTES OF GENERAL MEETING, 10 DECEMBER 1993

The meeting was opened at 8.10 pm

Present: P. Carwardine, I. Endersby, A. & E. Farnworth, D. & J. Holmes, P. Kelly, C., D. & P. Meehan, A. Morton, M. Schutze, R. Vagi.

Apologies: J. Burns, D. Crosby, D. Dobrosak, R. Field, C. Herd, T. New, N. & D. Stewart.

Minutes: Minutes of the October meeting (*Vic. Ent.* 23(6) 113-115) were received and passed after the addition of Mrs. E. Farnworth as present. (A. Farnworth/Kelly).

Member's Night exhibits:

Arthur Farnworth -	Slide presentation of various aspects of insect predation entitled "Gotcha".
Peter Carwardine -	*Jalmenus evagoras* larvae.
David Holmes -	*Ogyris* specimens.
Peter Kelly -	Bettle specimens demonstrating mimicry.
Tony Morton -	Publication on Butterflies of Saudi Arabia
Chris Meehan -	Butterfly larvae raising experiments.

General Business:

1. Membership

Mr C. Herd, Mr. G. Webb and Mr. P. Meehan were elected to membership

A Nomination was received on behalf of Mr Jeremy Michael Billington (M. Braby/I. Endersby). In accordance with the Society's rules an election will be held at the next general meeting.

A. Glaister and M. Pucetti were reinstated as financial members under rule 6(a).

2. An extraordinary Council meeting will be held on 21 January 1994 as a result of the meetings cancelled due to lack of a quorum.

The president wished all members the compliments of the season and closed the meeting at 9:45 pm.

MINUTES OF EXTRAORDINARY COUNCIL MEETING, 21 JANUARY 1994

The President, P. Carwardine opened the meeting at 8.05 pm.

Present: P. Carwardine, D. Dobrosak, I. Endersby, M. Hunting, R. Field, M. Malipatil, B. Vardy.

Minutes: Minutes of the September Council Meeting (*Vic. Ent.* 23(5): 91-92) were discussed . (Accepted Endersby/Dobrosak).

Correspondence: Detailed and received. (Field/Malipatil).

Treasurer's Report: Financial Statement as of 21 January 1994 was received from I. Endersby as follows:

1. GENERAL ACCOUNT:

SBV Bank Account		$ 3293
Term deposit due	24.11.97	$ 200
		$ 3493

2. LE SOUËF AWARD ACCOUNT:

SBV Bank Account		$ 531
Term deposits due	14.06.95	$ 1400
	24.11.97	$ 500
		$ 2431

3. JUNIOR ENCOURAGEMENT FUND:

SBV Bank Account		$ 107
Term Deposit due	24.11.97	$ 300
		$ 407

4. MEMBERSHIP:

Country	66
Metropolitan	39
Student	4
Life	2
	111
Associate	5
	116
Subscribers	12

New members:

Christopher Meehan	David Meehan
Paul Meehan	Cleveland Herd
Garry Webb	

Reinstated members deleted under Rule 6(a):

A. Sudholm

The treasurer tabled a proposed budget for 1994. Discussion ensued regarding areas of possible variation from the proposed budget. The Treasurer advised Council of the need to find an auditor for 1994.

Report accepted (Vardy/Malipatil)

Editor's Report: The Editor reported sufficient articles in hand for the next two issues. No new front cover illustrations, as requested in *Vic. Ent.* 23(5) were received to date. Council affirmed the Editor is empowered to decide on the selection and suitability of any illustrations if received prior to publication of the next issue of *Vic. Ent.*

D. Dobrosak moved that the printed number of copies of *Vic. Ent.* be 20 to 25 in excess of the mailing requirements and the Society retains the services of AGMEDIA for the next 12 months.
(Dobrosak/Field)

Excursions: The Excursion Secretary discussed the options available for excursions over the next few months. The possibility of an excursion to the Museum's Abbotsford Annex was favourably received.
I. Endersby moved that the Excursion Secretary approach the curator of Entomology, Museum of Victoria regarding an excursion to the Museum's Abbotsford annex. Passed (Endersby/Hunting).

B. Vardy reported insect houses had opened at Heathcote and Harcourt. B. Vardy would pass on phone numbers to D. Dobrosak to obtain further details.

General Business: (1). LE SOUËF AWARD COMMITTEE
The Committee advised Council that no award would be made for 1993.
R. Field moved that the council accept the recommendation of the Le Souëf award Committee. Passed (Field/Endersby)

(2). ENTRECS COMMITTEE
M. Hunting agreed to further investigate the recruitment of a third member to the Entrecs Committee.

(3) ANNUAL CALENDAR

I. Endersby and Dobrosak circulated drafts of proposed annual calendars. Discussion ensued regarding action items and timing on the calendar. D. Dobrosak agreed to consolidate and print a revised calendar for Council's use.

(4) SPEAKER FOR FEBRUARY MEETING.

R. Field agreed to approach Alan Yen in providing a speaker for the next meeting.

(5) The Treasurer commented on the success of the use of the Junior Encouragement Fund to provide bursaries for the Science Talent Search in 1993 and recommended Council continue this support in 1994.

(6) The President commented on the low attendance at meetings. It was proposed to survey members regarding what they want from the meetings. B. Vardy agreed to investigate and report to March Council meeting.

(7) Council discussed the difficulties associated with running the Society without a Secretary. Council members will approach individual members to fill the position of Secretary

(8) I. Endersby proposed one meeting per year (August), should be made available to entomological students to give a research report presentation. This was favourably received by Council. I. Endersby agreed to discuss the matter further with T. New.
I. Endersby also agreed to approach T. New regarding the Society sponsoring/assisting with a Summer School for year 11/12 students on Entomological topics.

The meeting closed at 10.05 pm.

SUBSCRIPTION REMINDER

Members are reminded that subscriptions are due at the beginning of the calendar year and it is of benefit to the Society if members pay promptly.

OBITUARY

Norman Barnett Tindale AO, 1900-1993

by Robert Fisher, S.A. Museum, North Terrace, Adelaide SA 5000

On 19 November 1993 Norman Barnett Tindale died in Palo Alto, California at the age of 93. Tindale was born in Perth, Western Australia,and at the age of six went with his parents to Japan, where his father was a missionary. He spent the next ten years in Japan, where he acquired a substantial knowledge of that nation's language and culture.

He returned to Australia in 1916 and in 1918 he joined the staff of the South Australian Museum. His great interest was in natural science, especially entomology, but at an early stage a laboratory accident damaged his eyesight, and he found great difficulty afterwards in using a microscope. His major studies changed then to the field of anthropology and here he achieved immense distinction, particularly in his studies of Australian Aborigines.

During World War II his knowledge of the Japanese language and culture was put to use by the RAAF, who appointed him as an intelligence officer, ultimately with the rank of Wing Commander. After the war the US Strategic Bombing Command also made use of his knowledge in assessing the effects of their attacks on Japanese factories.

His anthropological work continued after the war until his retirement from the Museum in 1965. He then accepted the chair of Anthropology at the University of Colorado and was awarded the honorary title of Doctor of Science. He lived thereafter in the United States.

Throughout his life Tinny, as he was known to his many Australian friends, retained an immense interest in entomology and studied particularly the Order Lepidoptera. His countless papers on moths and butterflies include many descriptions of new taxa and this will ensure that his name will continue to be mentioned by those, both amateur and professional, who study Lepidoptera.

On a personal note, I enjoyed many field trips with Tinny collecting and studying butterflies (and moths) both in South Australia and other states. We were often joined by people whose names mean more to today's older lepidopterists; names such as Frank and Sid Angel, Frank Parsons, Ras Wilson, Zoo Le Souef and others. I shall be grateful always for what Tindale taught me, and for his patience and willingness to listen to my queries at all times.

In January 1994, Dr. Tindale was awarded posthumously, the Order of Australia, in recognition of his contributions to ethnology.

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Compiled by D. Dobrosak

BIOLOGY AND DISTRIBUTION OF *TROGODENDRON FASCICULATUM* (SCHREIBERS) (COLEOPTERA: CLERIDAE), A MIMIC OF *FABRIOGENIA* SP. (HYMENOPTERA: POMPILIDAE: PEPSINAE)

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Abstract

The mimetic resemblance of *Tragodendron fasciculatum* (Schreibers) (Coleoptera: Cleridae: Clerinae) to *Fabriogenia* sp. (Hymenoptera: Pompilidae: Pepsinae: Agenielliini) is redescribed and the existence of a mimetic assemblage is postulated. The possible aggressive mimesis of *T.fasciculatum* with adults of its prey (or hosts) is examined. Predators and feeding records of the clerid are discussed. Distribution records for *T.fasciculatum* and a provisional distribution map are provided.

Introduction

Both Karargiris (1991) and Hawkeswood (1991) have recently discussed the biology of *Trogodendran fasciculatum* (Schreibers), known, at least since 1910, as the Yellow-horned Clerid (Froggatt, 1910; Carne, *et al.*, 1987). Both authors were apparently unaware of Nicholson's (1927) discussion of the species as a pompilid wasp mimic and his description and coloured illustrations of the model and mimic.

K.Moore (1961) thought that *T.fasciculatum* was "probably the most common of the Australian Cleridae". B.Moore (1990) also classed it a "common species ... often seen in gardens", but Hawkeswood considered it rare, having seen it in the wild twice in twenty years. Karagiris considered it rare also in South Australia, having encountered the species only on two occasions, in 1982 and 1989. I also have only two records: an unlabelled specimen obtained during childhood about 1965, possibly at Euroa or Wangaratta, northeast Victoria, with which I have associated active behaviour on a *Eucalyptus* trunk ever since, and another captured in flight at 11.45 am ESST on 30 December 1988, in the extreme northwest of Victoria at a site 5.3 km southeast of Berribee Homestead. T.New (pers.comm. 1993) has not seen the species alive, perhaps reinforcing the conclusion that the species is indeed "rare" in parts of its range.

Distribution

A distribution map for *T.fasciculatum* (figure 1) has been compiled from label data on specimens in the collections identified below and from literature records. These are not mapped with great precision and some points represent two or more localities. Many early specimens (especially in the Museum of Victoria) lack locality data. Reference has not been made to the numerous specimens which exist in other Australian collections and the interim nature of the map should be borne in mind.

ANIC Australian National Insect Collection, CSIRO, Canberra (Jan. 1993).
IGF Author's collection.
LU Latrobe University, Department of Zoology, Bundoora (1993).
MV Museum of Victoria, Melbourne (Nov.1993).
VAIAC Victorian Agricultural Insect & Arachnid Collection, Department of Agriculture, Melbourne (Nov.1992).

Queensland: Bluff Range, near Biggenden (ANIC); Bowen, 10 miles S (ANIC); Bundaberg (ANIC); Cairns (ANIC); Cunnamulla (ANIC); Gayndah (MV); Kuranda (ANIC); Millmerran (ANIC); Mitchelton (ANIC); Mount Walsh near Biggenden (ANIC); Mutchilba (MV); Rockhampton (ANIC); Sherwood (Brisbane) (Hawkeswood, pers.comm.); Tinaroo (ANIC); Toowoomba (Hawkeswood,1991);
New South Wales: Barham (ANIC); Blackheath (ANIC); Blue Mountains, lower (Hawkeswood, 1991); Bogan River, 24 mile E Coolabah (ANIC); Brewarrina (ANIC); Congo, 8 km ESE Moruya (ANIC); Deniliquin (ANIC); Durras North (ANIC); Eden (MV); Fairfield (ANIC); Gosford (MV); Hawkesbury River (Cleland *et al.* 1918); Hay (Froggatt, 1916); Hortons Creek, Grafton-Armidale Road (ANIC); Lisarow (Moore, 1963); Marsden, 12 mile NE (ANIC); Ruby Creek, 1 mile W of Amosfield (ANIC); Sydney (ANIC); Sydney University (ANIC); Tumut (ANIC); Ulinda Creek, 11 km SSW Binnaway (ANIC); Wahroonga (ANIC); Yass (ANIC);
Australian Capital Territory: Australian National University (ANIC); Black Mountain (ANIC); Blundells (ANIC); Canberra (ANIC; LU, New pers.comm.); Cotter River (ANIC); Molongo Gorge (ANIC); Mount Franklin (ANIC); Pine Island (ANIC);
Victoria: Berribee, 5.3 km SE (IGF); Birchip and Sea Lake districts (Goudie, 1924); Cann River (MV); Caulfield (MV); Cobram (VAIAC); Creswick (Q.Wang, pers.comm.); Geelong (VAIAC); Koondrook (VAIAC); Launching Place (MV); Mallee (VAIAC); Melbourne (VAIAC, MV); Mordialloc (MV); Morwell (ANIC); Mount Macedon (VAIAC); Newborough (ANIC); Traralgon (ANIC); Tyers River, Gould (ANIC); Warburton (MV);
South Australia: Adelaide (ANIC); Kangaroo Island (Schenkling, 1910); Morphett Vale (Karargiris, 1991); Mount Lofty (ANIC); Purnong (MV);
Western Australia: Albany (ANIC); Boyup Brook (ANIC); Boyup Brook, 64 km S (ANIC); Crawley (ANIC); Denmark (ANIC); Mundaring (ANIC); Nedlands (ANIC); Perth (ANIC); Wilga (ANIC).

Not mapped: NSW Hortons Creek, Vic Mallee.

Information is far from complete but the pattern confirms Froggatt's (1916) statement that the species has a "wide range over Australia", at least in the eastern states. It is not known from Tasmania (Semmens *et al.* 1992). The map shows notable concentrations around the capital cities and like many such insect maps needs to be interpreted as the distribution also of entomologists. Froggatt (1901) included the species in his discussion of the insects of "central Australia", an area he defined by "drawing a circle a hundred miles inland from the coast lines". As far as I am aware it is not known from what is currently recognised as Central Australia and it appears to be absent from the interior of the continent proper, except for minor penetration at the eastern edge in southern Queensland and the central west of New South Wales. Evidently it can tolerate a wide range of environments from subequatorial wet coastal at Cairns and subalpine at Tumut to low rainfall dry inland at Hay.

Biological Notes

Interesting data is attached to material from Melbourne (VAIAC) collected by S.Erlich on 13 Feb.1959: "Found on timber from New Zealand, probably got on the ship in Melbourne", and Tinaroo, Qld. (ANIC), collected by D.& N.McFarland, 14-18 Feb.1972, "in light rain at light". Another specimen (MV) from Melbourne, collected by F.E.Wilson, has immature material preserved in a fine glass pipette pinned with the adult. The label data states: "2 x 65 eggs. Laid 18.2.29. Hatched 9.3.29. Larva reddish." Wang (pers.comm.) obtained a larva at Creswick, Victoria, on 10 December 1991. It pupated in June 1992 and the adult emerged in October.

Hawkeswood (pers.comm.1993) has provided details of his observation of one beetle on a *Eucalyptus* sp. on the banks of the Brisbane River at Sherwood, Queensland, during December 1991. It "moved down the side of a flower and flew rapidly to the branchlets supporting the inflorescences ... moved rapidly along the branchlet towards the trunk of the tree a short distance with fast movements of the antennae etc. and then flew over to the trunk ... some 2-3 metres ... from the flowering branch ... remained motionless only briefly before becoming active again, rapidly moving up the smooth areas of the tree trunk that were exposed to the sunlight for a distance of about 1 metre before it moved to the other side (shaded) of the ... trunk" and apparently flew away.

Hosts and Prey

The feeding behaviour of *T.fasciculatum* has not been thoroughly studied. Froggatt (1901, Hawkeswood pers.comm.) stated that it "flies about in the hottest weather and feeds upon other insects". Froggatt (1910) stated that "the beetles lay their eggs upon the pupae or in the cavities made by many of the wood-boring moths. The larvae destroy the pupae of the moths, and when full-grown they pupate in the remains of their victims". Clausen (1940) repeated this information.

Later (1916, and repeated *verbatim* in 1923) Froggatt described its biology in more detail but in rather different terms, detailing personal observations of the larva as a predator of larval *Phoracantha recurva* Newman (Coleoptera: Cerambycidae). He stated, somewhat ambiguously, that although "this beetle is recorded in *Australian Insects*" (his 1907 book) "as a parasite of some of the wood moths in their pupal state, this is the first account of the life history, and the first record of the important part it plays in the destruction of the larvae of the wood-boring longicorns". But are "wood moth" larvae also hosts? Is the larva of *T.fasciculatum* a predator or a parasitoid?

McKeown (1938) noted that *Trogodendron*, and *Scrobiger*, another clerid with similar appearance, are predaceous in both their adult and larval stages on cerambycid larvae and he reiterated (1945) Froggatt's (1916) observations of *P.recurva*. Possibly McKeown had personally observed attacks by adults and larvae on longicorn larvae apart from *P.recurva*, but these were not described. *P.recurva* is the only longicorn prey recorded in Duffy's (1963) monograph on the biology of Australasian cerambycids.

Moore (1961) stated that the larvae are "mostly predatory on larvae and sometimes adults of Cerambycidae, Bostrychidae, Anobiidae, Lyctidae and other wood-boring Coleoptera" but "mainly confine their attacks to the larger species of the Cerambycidae". He recorded (1963) that the bright pink larvae of *T.fasciculatum*, up to 40 mm in length, were "probably the most

common" of four species of clerid larvae attacking larval longicorns in logs of *Angaphara flaribunda* (Sm.) Sweet at Lisarow, New South Wales. However "specific identification of all the longicorn larvae occurring on the logs ... was not possible and mortalities were considered as being due to those factors affecting the larger species", *Phoracantha semipunctata* (Fabricius), *P.recurva* and *Epithara darsalis* Macleay. Moore's methodology was not clearly enough explained to determine whether the other cerambycids he studied, *Coptocerus biguttatus* (Donovan), *C.aberrans* (Newman) and *C.rubripes* (Boisduval) could also have been prey for the clerids. Moore (1972) later stated that all of the predators he had previously recorded "exerted varying degrees of control of the cerambycid larvae attacking logs". But it is nowhere really clear that longicorns other that *P.recurva* were attacked by *Tragodendron*.

Hadlington & Johnston (1982, p.59) stated that *T.fasciculatum* attacks "longicorns and jewel beetles and their larvae" but provided no specific instances. Lawrence & Britton (1991) stated that *T.fasciculatum* is an "important predator of wood-boring Cerambycidae". Karargiris (1991) described a probable association with *P.semipunctata* Fabricius.

Except for Froggatt's (1901) vague statement and Hadlington & Johnston's claim, the food of adult *T.fasciculatum* appears to be unknown. But the literature indicates that the larvae may be predatory or parasitic like some other species of Cleridae mentioned by Clausen (1940), such as *Trichodes*, in which maturity may be reached upon a single host in certain circumstances and by the consumption of a number of hosts at other times.

Mimicry

Nicholson (1927) detailed the mimetic resemblance of *T.fasciculatum* to a wasp identified as *Pseudagenia consaciata* Turner of the Psammocharidae (known now as Pompilidae). McKeown (1945) noted that *T.fasciculatum* bears a "resemblance to certain *Sphex* wasps" (Sphecidae) and Hawkeswood (1991) agreed that there is 'apparent mimicry'. Earlier Goudie (1924) had stated that "on a hot day this beetle is very active and restless, reminding one of a wasp". Karagiris (1991) "at first mistook" an individual active on a tree trunk for a large wasp. The resemblance seems to be apparent to most observers.

However Blackburn (1900), whose enormous taxonomic output is very rarely punctuated with field observations, suggested it was probable that when the life history and habits of *Trogodendron* Spinola were discovered it would be found that it "mimics the facies of the group of insects on which it is parasitic". He considered that *Phlogistus* Gorham (as *Aulicus* Spinola), *Scrobiger* Spinola, and *Neascrobiger* Blackburn, would also be found to be similar sorts of mimics (*Neoscrobiger ephippius* (Boisduval) is now recognised as a *Trogodendron* by Gerstmeier: see Matthews, 1992). According to this proposition *Trogodendron* should be a cerambycid (Coleoptera) mimic.

The Model

At Berribee, Victoria, a wasp was observed which appeared to be the model for *T.fasciculatum*. A female specimen was collected on the hot afternoon of 3 January 1989, precisely because of its behavioural and morphological resemblance to the beetle captured a few days earlier at the same site, and the wasp was held in my collection beside the apparent mimic. Individual wasps spent much time moving rapidly over the pale trunk bark of large River Red Gums, *Eucalyptus*

camaldulensis Dehnh., growing beside the Lindsay River, their antennae flicking quickly and abdomen pulsing, stopping occasionally to investigate crevices and moving also over the hard clay river banks beneath the trees. The presumed model was certainly more common than the apparent mimic. Although my experience of both species was very limited, it was the behavioural similarities which seemed to be most striking.

The wasp has been identified by Dr.I.D.Naumann as a species of *Fabriagenia*, a pompilid, not a sphecid, and the specimen is readily identified to Pepsinae (Pompilidae) using Naumann's (1991) keys. The specimen is very similar to one in the Australian National Insect Collection collected at Canberra on 5 December 1950 by E.F.Riek and labelled *Phanagenia consociata* Turner. This specimen was apparently compared by Dr.J.C.Cardale to material in the Queensland Museum identified by H.Hacker (Naumann, pers.comm.). It is also very similar to a specimen of *Fabriogenia* determined by R.E.Turner in 1929 as *Pseudagenia pravida* Turner. It appears therefore that the observations at Berribee provide independent confirmation of the mimicry identified by Nicholson (1927), with the model being either conspecific or very closely related.

However this will not be resolved until revisional taxonomic work on the wasp taxa is completed. The existing literature on Australian pompilids is confusing. The generic classification of the Ageniellini (previously known as Macromerini or Auplopodini), to which *Fabriogenia* belongs, is unstable, and most Australian species in the tribe may be referable to *Auplapus* (Naumann, pers.comm., 1993). In addition to *Fabriogenia* and *Auplapus* the generic names *Phanagenia* and *Pseudagenia* have been ascribed to specimens of Australian Ageniellini. Riek (1970, p.930) provided a line drawing of a representative of the tribe (cited as *Phanagenia* sp. by Riek, corr .ted to *Fabriagenia* sp., Pepsinae-Aulopodini in CSIRO, 1974, p.134), and reproduced by Naumann (1991, p.976, Fig.42.30.C), who retained the name *Phanagenia* but who has noted (pers.comm.) that the insect illustrated cannot be re-identified at present. CSIRO (1970 & 1991, plate 6V) provided a colour illustration of an ageniellinine, identified as *Phanagenia* (CSIRO, 1970), *Fabriagenia* (CSIRO, 1974 p.131) and *Auplapus* (Naumann, 1991). Until such time as the Ageniellini is revised it will not be possible to confidently attach a generic or specific name to the Berribee specimen.

The biology of the Ageniellini is partially known. Pompilidae in general are nest-building predators or parasites of spiders, or of other pompilids, and provision each nest cell with a single prey item (Naumann 1991). According to Evans and Matthews (1973): "The species of *Fabriogenia* amputate the legs of the spiders and carry them to the nest by straddling them and walking forwards (as do other Auplopodini)." Adult Pompilidae inject powerful venoms when they sting and display aposematic (warning) colouration to advertise this fact (Norris, 1991). Riek (1970, pp.882,929) stated that species of *Fabriogenia* (as *Pseudagenia*, see CSIRO, 1974, p.134) construct mud cells "under bark or in other sheltered situations" and that specimens have been found carrying pollinia attached to their legs and are important in pollination. Evans and Matthews (1973) recorded the nest of *Fabriogenia canberra* Evans in an old mud nest of *Sceliphron* (Sphecidae) at Canberra. Naumann (1991) noted that species of *Auplapus* nest "in hollow twigs or abandoned nests of other aculeates, making cell walls of mud and closing the nest with mud and resin". He has pointed out (pers.comm.) that all these nest sites are pre-existing cavities.

Resemblance of Model and Mimic

The discussion on *T.fasciculatum* and its model provided by Nicholson (1927) is worth repeating in detail because his paper is now rather obscure and the relevant material is not

readily located amongst the much larger body of discussion. He states (p.64): "One would not be impressed with the resemblance ... from an examination of the illustrations of these species; yet, under natural conditions, the resemblance is closer than that exhibited by a number of other mimetic insects which appear to be more prefectly mimetic according to the photographs. Large black psammocharids with conspicuous bright yellow antennae, such as *P.consaciata*, are very common. They are usually to be seen on the ground or tree-trunks, and their most conspicuous characteristics are rapid movements and a rapid vibration of the antennae. *T.fasciculatum* mimics these habits to perfection. This clerid arrives within the field of vision with almost the velocity of a bullet, gives an impression of commotion when settling and proceeds to move about with rapid, jerky hunting movements, waving its conspicuous bright yellow antennae in exactly the same manner as its model. It will be observed that the resemblance in this case is almost wholly due to mimetic habits, assisted by the bright yellow antennae. The general colouration is similar to that of *P.consociata*, but there is little in common between the forms of the two insects. This however does not attract attention under natural conditions, the background usually being dark coloured."

The general behavioural similarity is perhaps reinforced by a few other pertinent observations. Hunting female pompilids "often walk or hop quickly with the wings flicking rapidly" (Naumann, 1991). Male Pepsinae "in particular, frequent smooth tree trunks in bright sunlight" (Rick 1970). *Fabriogenia consociata* (Turner) is "commonly seen on the trunks of eucalyptus trees near Canberra" (Evans & Matthews 1973). Karagiris (1991) described in detail the behaviour of adult *fasciculatum*: the great rapidity of its movements on tree trunks, antennal waving, and flight in sunshine.

The morphological similarities between the two species appear to be greater than recognised by Nicholson. A comparison of the two beetles and the single Berribee *Fabriogenia* specimen shows that they are of about the same general size (length 16.5 and 17 mm for the beetles and 14 mm for the wasp). The antennae of the presumed model and mimic are of the same deep yellow, almost orange, colour in the preserved state and are of the same approximate length and width. An overall black colouration and the somewhat shiny dorsal surface of the abdomen is common to both species. In a certain light, patches of setae on the wasp approximate some of the grey areas on the body of *T.fasciculatum*, and in the dorsal view, the wasp's waist (the petiole) is not apparent so that the mesosoma and metasoma appear to merge smoothly and appear more like the cylindrical abdomen of the beetle. However the elytra of the beetle are markedly wider that the metasoma of the wasp, a disparity which would be considerably reduced if the wasp should hold its wings at rest over the metasoma. If the forewings of the wasp are held in such a resting position that the costa forms a narrowly acute angle with the main body axis, a dark band on the wings is located approximately in the same position as the prominent velvety black feature on the posterior half of the elytra of *T.fasciculatum*. Thus there is a marked resemblance of both static and active appearances, both species being aposematically coloured in black and yellow-orange, and both being very active and aggressive.

Mimicry and Defensive Adaptations

But there is no feature in the *Fabriogenia* corresponding to the small orange patches on the sides of the elytra of *T.fasciculatum*, unless it is a series of subtle reflections from the wings. The tarsi of the beetle, particularly the fore tarsi, are also yellowish while the wasp's are dark. The wasp's warning colouration of black and orange is outclassed. The wasp's sting is perhaps matched to some extent by the bite of the beetle which Froggatt (1916) described as "a bulldog-

like grip", so persistent that it may "sometimes let one pull its head from the body sooner than loosen its hold". The two species may provide an example of Mullerian cooperative evolution: predation of both is reduced because of the educative effect of the similar aposematic colour patterns advertising different injurious or distasteful properties (Nichols, 1989; Norris, 1991). Reports that adult *T.fasciculatum* are "fearless and easily caught" (Froggatt, 1916) suggest it might rely on active defences rather than immediate escape mechanisms when confronted by a predator. The bite of *Tragodendron* would need to be effective against birds, which appear to be the dominant vertebrate predators of Coleoptera (Crowson, 1981), if it, and *Fabriagenia*, are to be classed as Mullerian mimics.

Although our knowledge of bird predation of Australian insects is very limited, *T.fasciculatum* has been recorded by Barker & Vestjens (1990, p.36) in the diet of one bird, the Black-faced Cuckoo Shrike, *Coracina novaehollandiae* (Gmelin). Unfortunately it is recorded both by scientific name and as a "ladybird". The original observation (Cleland *et al.*, 1918) confirms that the specimen, identified by Froggatt, was in fact *T.fasciculatum*, and that along with other Coleoptera it came from a bird taken at the Hawkesbury River, New South Wales, on 16 October 1910. There is also only a single record in Barker & Vestjens (1990) of bird predation of Pompilidae: *Cryptocheilus* sp.(Pepsini), taken by a Noisy Friarbird, *Philemon corniculatus* (Latham). Since such wasps seem to be more common than *Trogodendron* this information might indicate that the beetle is rather less able to defend itself against birds than the wasp.

Since the sting of a pompilid is likely to be a more effective defence than the bite of a yellow-horned clerid, and both insects have similar escape responses, some other factor, perhaps a chemical defence, would seem to be necessary to put *T.fasciculatum* on equal footing with *Fabriogenia*. But no chemical defences of clerids were mentioned by Crowson (1981). It may be then, that the adult Yellow-horned Clerid is more nearly a Batesian mimic of the wasp, being "rare" while the wasp is common, having similar aposematic appearance (Nichols, 1989; Norris, 1991) if not a certain 'hyper-aposematism', but having less powerful active defences. In order to be a Batesian mimic, the adult of *T.fasciculatum* needs to be "highly acceptable as food for predators" (Norris 1991) or at least palatable (New, pers.comm.). But as we have seen the available predation information is insufficient to determine if this is the case.

Nicholson's statement that the model and mimic are usually found on dark backgrounds is probably erroneous and theoretically unlikely since aposematic colouration is meant to be noticed.

Mimicry of Cerambycidae?

Adults of both *Pharacantha recurva* (larvae are the only known specifically identified prey of *T.fasciculatum*) and *P.semipunctata* (larvae suspected to be prey) have a dark, shiny disruptive camouflage band on the distal half of the elytra which roughly approximates the black, velvety, elytral band of *T.fasciculatum*. The feature is of common occurrence in the Phoracanthini and may function as disruptive camouflage by breaking up the long shape of the elytra. Thus there is one character at least which affirms Blackburn's (1900) suggestion that clerids such as *T.fasciculatum* would be found to resemble their "hosts". But any other visual resemblance between these *Phoracantha* species and *T.fasciculatum* is not striking and their behaviour and locomotion are very different.

McKeown (1938) described *Aridaeus cleroides* (Cerambycidae) and considered that its shape, black body colour with L-shaped white line on each elytron, and dull red antennae, gave it "a remarkably strong resemblance to the Clerids of the genera *Trogodendron* and *Scrobiger*". Later (1945) he noted that it "bears an amazing resemblance" to *T.fasciculatum*. Since it is a wood boring cerambycid it seems possible that *A.cleroides* is preyed upon by *T.fasciculatum*. The host plants of *A.cleroides* appear to be unknown, but *A.thoracicus* (Donovan) appears to be polyphagous in several plant families although it is not recorded attacking *Eucalyptus* L'Herit.(Duffy, 1963; Hawkeswood, 1985, 1988; Williams, 1985; Webb, 1987, 1993; Webb *et al.*, 1988; Hockey & de Baar, 1988). I am not aware of any field evidence of an association between *cleroides* and *fasciculatum*, but mimicry requires that the model and the mimic live together.

Although Blackburn (1900) thought it might prove to be the case, it would be remarkable if a predator such as *Trogodendron* had evolved to resemble the adult form (longicorn beetles) of the juveniles on which it and its larvae might prey, and other examples of such a form of mimicry appear to be rare. Such a situation would be an example of aggressive mimicry, where a predator resembles its prey in order to facilitate prey capture (Edmunds 1974). One probable Australian example involves a species of *Chlamydopsis* (Histeridae), a genus which is found in the nests of ants, is "presumably" predatory on ant larvae (Matthews 1982) and individuals of which are able to withdraw their appendages and head in a defensive posture. When so frightened, one species, *C.granulata* Lea, "bears a strong resemblance to the large head" of the *Phediole* ant, the nests of which the beetle inhabits (Davey 1925). Eisner *et al.* (1962) described predation of adult *Lycus* species (Lycidae) by adult *Elytroleptus* species (Cerambycidae) which are excellent mimics of the lycids. However they provided evidence that the mimicry is Batesian and possibly at times Mullerian, but not an example of aggressive mimicry in the strict sense. Blackburn's suggestion is not in keeping with current understanding: the uncommon *Trogodendron* mimics the wasp, which is more common, has warning colouration and the matching strong defences.

A Mimetic Assemblage

Other species of Pepsinae have similar colour patterns to the Berribee *Fabriogenia* and comprise a complex of models of which there appears to be a complex of mimics. Among the Ageniellini, specimens at ANIC identified as *Auplopus australis* Cam. and *A.canaliculatus* Mihi by R.Wahis are similarly coloured but considerably smaller. *Pseudagenia provida* Turner (Turner det.) is similar but much larger and has much more infuscation of the wings. *Fabriogenia dilga* Evans is rather too small. In the Pepsini *Priocnemis tenulus* Turner is similar to the *Fabriogenia* but has orange forelegs.

Several clerids have similar appearances to *T.fasciculatum*. *Trogodendron (Neoscrobiger) ephippius* (Boisduval) is very like it, but is a much smaller species (length ca.9 mm). Among other species worthy of mention *Scrobiger splendidus* Newman, *Eleale pulchra* Newman, *Stigmatium victoriae* Kuwert and *Zenthicola funestus* Chev. bear more remote resemblances to *T.fasciculatum*. Larvae of *S.victoriae* also attack longicorn larvae (Moore 1961).

The fly *Agapophytus flavicornis* Mann (Therevidae) is a Batesisan mimic of *Auplopus* sp. (CSIRO 1991 plate 6W) and species of *Agapophytus* are common on tree trunks (Colless & McAlpine 1991).

The information at hand indicates that *T.fasciculatum* is probably a Batesian mimic of *Fabriogenia* and of other pompilid wasps of similar appearance, but because of its own strong defences the mimicry tends towards Mullerian. Clerids of similar facies such as *T.ephippius* (Boisduval) may be part of a Batesian/Mullerian mimetic assemblage. The cerambycid *Aridaeus cleroides* and the fly *A.flavicornis* may be Batesian mimics of the wasp or of the wasp-clerid mimetic complex. Additional field obsevations are needed to elucidate these relationships. Although predation patterns of the clerids are poorly known the suggestion that they mimic adults of species (particularly Cerambycidae) which provide hosts for the larval clerids cannot be totally dismissed and is a useful alternative hypothesis.

Rarity

As "a general rule mimics are less common than their models, and usually comparatively rare" (Nicholson 1927) because the predator deterrence value of the mimicry is much reduced when a palatable mimic is common. A specialised predator such as the Yellow-horned Clerid might be expected to be "rare", at least in comparison to its prey, *Phoracantha* longicorns, which are common. The natural scarcity of dead and dying trees infested with the wood-boring hosts may have been a factor limiting its breeding to isolated discrete sites separated by long distances from the sites where the adults matured. Since European occupation of the continent the number of dead trees in a particular district has most likely been much multiplied at certain times and the yellow horned clerid may actually have benefitted, at least during certain historical periods.

Modern silvicultural and horticultural practices such as the removal of suitable habitat trees and timber, plus such widespread practices as "regeneration" burning, which encourage even-aged stands of trees and destroy fallen branches, have not been assessed in relation to their effects on such species; in fact there have been very few studies of the effects of forest fire and silvicultural practice on insects in Australia (New, 1984). The projects related to insect conservation detailed by Neumann (1987) for Victorian forests fail to address this question. Current practices vary, but usually large and small branches and the tops of trees are left *in situ* after logging and these are then sterilised (in terms of habitat for most insects usually associated with sound wood) with "controlled" burning. In urban areas the managers of parks and gardens often insist that trees suitable for, or under attack by longicorns ("borers"), be immediately removed, and the usual explanations for this practice are firstly the unsightly appearance of dead trees and secondly the danger to the public from falling branches, etc. Reasoning along such lines has had an insidious impoverishing effect on urban wildlife.

When species such as *T.fasciculatum* have been better studied we might well find that the advice of Crowson (1981) should be heeded: in "a small reserve, the periodic deliberate killing of occasional trees might enable many species to be maintained which would otherwise die out".

The Berribee specimen of *Fabriogenia* has been deposited in the Australian National Insect Collection.

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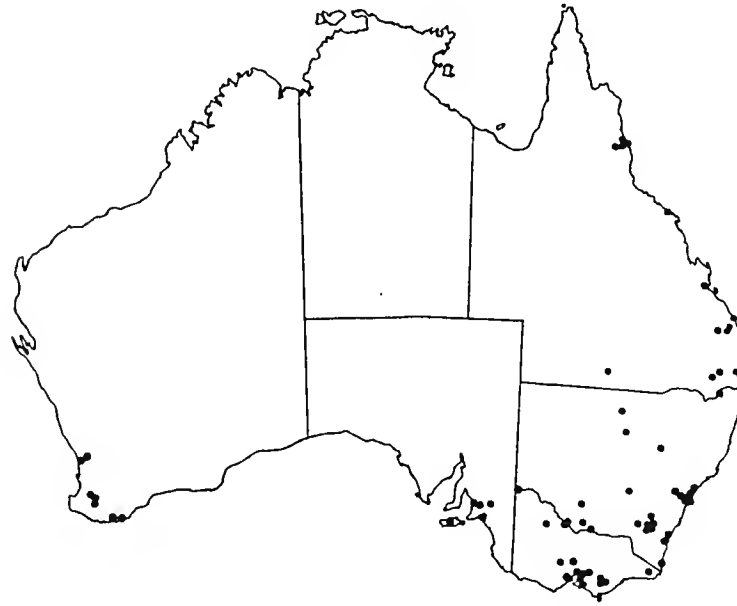

Figure 1. Interim distribution map of *Trogodendron fosciculatum.*

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LEPIDOPTERA NATURALLY BREEDING IN MALVERN by Peter Carwardine

The Hon. Editor apologies for several typographical mistakes in this article the most notable being the emission of the two species below:

• *Danaus plexippus plexippus* (Linnaeus)	*Asclepias fruticosa* (Swan Plant)
Junonia villida calybe (Godart)	*Antirrhinum majus* (Snapdragon)

•Bred on adjacent property

DISTRIBUTION AND FOODPLANT RECORDS FOR *DEUDORIX* BUTTERFLIES IN NORTHERN QUEENSLAND (LEPIDOPTERA :LYCAENIDAE)

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Introduction

Deudorix epijorbis (Moore) has previously been credited with two subspecies within Australia - *diovis* Hewitson, ranging from Mackay to Gosford, and *dido* Waterhouse ranging from Cape York to Tully (Common & Waterhouse, 1981). However, it is quite apparent, and as discussed by Dunn & Dunn 1991, these two subspecies are almost certainly separate taxa whose distribution overlaps in northern Queensland, noticeably on the Atherton Tableland.

Observations

When viewed simultaneously, adults of either taxa are fairly readily distinguished. Firstly, adult females of *diovis* are a more uniform slate grey colour upperside, whilst *dido* females are a distinct dark brown upperside. Secondly, adult males of *diovis* are a much brighter orange upperside compared with males of *dido* upperside. Another feature that appears to be constant (in northern specimens) is a distinctly orange colouration to the front of the head between the compound eyes, to a varying extent but always present, of adults of both sexes of *diovis*. This has not been observed on adults of *dido* to date.

Both species occur on the Atherton Tableland, sometimes breeding on the same trees, as is the case near Julatten, where larvae of both species feed within the fruits of *Litchi chinensis* (Sapindaceae), as well as utilising *Connarus conchocorpus* (Connaraceae). Adults of *dido* have been reared from within the fruits of *Salacia chinensis* (Celastraceae) near Cape Tribulation, Qld., during September - October. At Tinaroo Falls Dam near Atherton, *diovis* breed within the fruits of *Horpullio* sp. (Sapindaceae) with two distinct broods being noted, first in October - November, secondly in March - April. Near Yungaburra, adult *dido* males have been collected flying high in the rainforest canopy adjacent to *Horpullia* sp. trees during November.

Adults of *diovis* have been collected from the summit of Bell Peak North, east of Gordonvale, during November, also from Goldsborough near Gordonvale during March, and similarly on the summit of Mt. Stuart, Townsville, during April. Adults of *dido* have been collected from the summit of Walsh Pyramid near Gordonvale during November.

Conclusions

These two taxa have a well defined overlap of distribution in northern Queensland, with *diovis* having been recorded from Murray Island, Coen, Atherton Tableland, and Townsville to Toukley in N.S.W., and *dido* recorded from Cape York to the Black River, 17 km. W. of Townsville (Dunn & Dunn, 1991). Undoubtedly, more hostplant associations will be encountered. Comparison with similar taxa from Papua New Guinea may prove an extended distribution for either of these species.

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OVIPOSITION AND TERRITORIAL BEHAVIOUR IN *CEPHRENES TRICHOPEPLA* (LOWER) (LEPIDOPTERA: HESPERIIDAE: HESPERIINAE), AND A NEW DISTRIBUTION RECORD

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Abstract: Territorial and oviposition behaviour in *Cephrenes trichopepla* (Lower) are described and discussed. Male territories were associated with foraging and emergence/oviposition sites. Ovipositing females settled quickly and laid on palm fronds without preliminary contact with host foliage. A new southern distribution limit in northern New South Wales is provided.

Introduction

The two Australian palmdart species, *Cephrenes trichopepla* and *C. augiades*, have gained increasing attention over the last decade in regard to their general biology (Lyonns 1988), significant range expansions (Williams 1993), and more recently the large number of palm genera under attack by the larvae (Dunn 1993e). There are records of *trichopepla* from at least 105 sites in Australia compared with a minimum of 151 for *augiades* (Dunn & Dunn database; n_t=100 000). This brings both species on par with other 'common' butterflies which are currently known from similar numbers of sites (ie. 100-200 sites). Detailed information on the biology of one species (*augiades*) was given by Lyonns but very limited information is available for *trichopepla*. The details of oviposition and territoriality in *Cephrenes* presented by Lyonns are rather general, her work focussed primarily on aspects of host selection in *augiades*. Despite this, a variety of biological observations on both species were documented by her, but much of this unpublished data is still not widely available.

Distribution and Abundance

Following European settlement both *Cephrenes* species have invaded residential and cleared areas and, over the last two decades in particular, have significantly expanded their distributions due to extensive ornamental plantings of host palms (Hutchison 1983, 1988, 1989, Petrie 1985, Crosby 1990, Williams 1991, 1993, Dunn *et al.* 1994). Current range expansions in Western Australia to the known distribution of *trichopepla* (Dunn & Dunn 1991) were recently documented by Williams (1993). In northern New South Wales, Petrie recorded this species as far south as Byron Bay, but in November 1993 two late instar larvae (both of which I reared to adults) were found on *Phoenix* spp. at Woodburn (voucher specimen in ANIC). This record extends the known distribution south-west by about 60 kilometres. Currently *trichopepla* may extend more or less continuously to some unknown point beyond Woodburn, but Andrew Atkins (pers. comm.) has confirmed their absence from the Newcastle region at the present time. Although not recorded at the locality until January 1985 (Morton 1988), Carnarvon Gorge National Park, SW of Rockhampton, was probably the natural southern limit of this species in Queensland prior to its wide dispersal on potted palms. The butterfly has been known from central Queensland (at Westwood) since February 1925 (Museum of Victoria).

In the McPherson region [SE Qld & NE NSW] adults of both taxa are present in all months. The number of recorded sites (McPherson) gives a ratio of 3:5 for *trichopepla* and *augiades*,

respectively, with the number of data entries (records) being 1:2 (n=130) (Dunn & Dunn 1991). This suggests a much greater abundance of *augiades* in this region. Tallied incidental observations recorded by me over a year period in the Beenleigh area (since August 1992) suggests that *augiades* is at least twice as abundant as *trichopepla* overall. The difference in abundance is most marked in spring; the cool winter appears to deplete *trichopepla* numbers. During summer, however, *trichopepla* numbers (larvae and adults) increase rapidly and then approach the levels of *augiades* for several weeks. In contrast, *augiades* appears similarly abundant in all months near Beenleigh.

Observations

Territorial Behaviour: The males of both *Cephrenes* species are territorial and establish perch sites on or near larval host and at or near foraging sites. Sites especially favoured by males are those which overlook both palms and blossoms. Perching males of *trichopepla* adopted a stance typical of many other hesperiines. They settled with forewings partially open in a V-shape and with hindwings laying horizontal or almost so, somewhat similar to the male perching pose of *Suniana sunias* (Dunn 1993c).

In my garden at Eagleby Qld, *trichopepla* males sometimes perched near *Buddleia davidii* (Buddlejaceae) at which they, and *augiades*, both sought nectar; the latter, however, more frequently fed at this plant than did *trichopepla* (earlier observations of *augiades* adults feeding at *Buddleia* were given by Brown (1984) and Crosby (1990)). Adults of *trichopepla* were more commonly seen feeding at *Bougainvillea* (Nyctaginaceae), and sometimes perched on this plant. More often perch sites were associated with larval hosts rather than flowering plants. On one occasion a perch site was clearly associated with the palm *Phoenix roebelenii*, and at Beenleigh I observed several males perched on and about a young (3m high) *P. canariensis*. More recently, in the Mount Coot-tha Botanical Gardens, I observed a male perched on *Caryota rumphiana* overlooking a known host *Ptychosperma elegans*. Similarly, whilst in Townsville CBD I regularly encountered several males perched on and near *Chrysalidocarpus lutescens* and about an undetermined fan palm planted nearby. Some years ago, near Mataranka Homestead in the Northern Territory, I found several males perched on riparian shrubbery near tall *Livistona* palms.

At Eagleby males of *trichopepla* often established perch sites at about 1-3 metres above ground. Males of *augiades* also perched in the same general area as those of *trichopepla*, but not usually at the same instance in time, their perch sites ranged from about 2m above ground up to at least 4m. Perch selection in *Cephrenes* where they were active together seemed stratified in part. Both species usually perched for extended periods, and brief patrolling of the territory regularly occurred after disturbance. Although adults of both species are active throughout the year in the Beenleigh district, on some occasions no adults were conspicuous about the larval hosts in my garden or at the regular selected territorial sites nearby.

At Eagleby on 27 and 28 February 1993, with shade temperatures of 34°C and 35°C respectively, males of *trichopepla* were repeatedly observed defending territories. These males settled on substrates such as alloy and wooden fences at heights ranging from 1m to 3m above ground. The temperature of the metal substrates in the midday sunshine seemed of little concern to the butterfly. On this occasion they also utilised various scrubs and settled at 1-2m height and, in the direct afternoon sunshine, facing easterly, overlooking the sunlit area. In this area a few medium sized (about 7m) *Archontophoenix alexandrae* and *A. cunninghamii* palms were

present. Territories appear to be established by 11am (EST) and were maintained periodically through to about 3pm depending on prevailing weather at any point in time. Sites shifted with changes to the degree of sun exposure received by the habitat. At times in the afternoon more than one *trichopepla* adult would perch in the same area, selected sites (occupied simultaneously) were sometimes within 3-4 metres of each other. Despite their close proximity adults appeared site tenacious and aggressive. One male challenged a male *Catopsilia pomona* (Pieridae) flying some 4m away, but this adult was not seen to pursue butterflies at greater distances from his perch. Perching males ignored human passer-bys even when walking within 1m of their perch. In addition, slow hand movements within 10cm of their eyes were ignored, but closer movements to within 5cm resulted in the adult rearing slightly in preparation for rapid departure. Attempts to invade closer resulted in the male departing for a minute or two before returning to his perch. In general the adult seemed reluctant to depart except to pursue other butterflies.

Male *trichopepla* made periodic surveillance flight up to about 8m from their perch. Each flight comprised several elliptical-arc shaped patrols at approximately the height of the perch. The first arc was often of a larger distance from the site than the subsequent ones, eventually bringing the adult back to its perch. Generally about 3-4 'boomerang'-shaped flights were taken before it settled again. Males raced off at high speed after conspecifics, one adult usually flew below the other, before they returned quickly to perch again. The male's decision to pursue an invader may have been associated with the insects speed rather than its size. Other hesperiine skippers and *Catopsilia* butterflies are fast moving insects. Patrols usually occurred after some disturbance.

Oviposition behaviour: At Eagleby on 20 February 1993, at 12:10pm (EST) with a shade temperature of 30°C, a large female hesperiine skipper was observed flying about 2m above ground around a lower pinnate frond of a mature *Arecastrum romanzoffícianum* -a known larval host.

The female flew back and forth a couple of times about the frond and then settled quickly, with wings fully closed above the thorax, on a dried tip of an old pinnule situated in full sunshine. She did not contact the palm foliage prior to landing. Upon my approach, her identification as *trichopepla* was immediately confirmed by the distinctive hindwing pattern on the underside which was then clearly visible. She was in good condition with limited wear to the wing tips, and no obvious wing damage in the way of chips or torn sections. Immediately after settling she curved her abdomen beneath herself, in an arc shape, to deposit a single egg by abdominal movements. The abdomen was quickly withdrawn and she then flew behind the frond and main trunk, before landing again, facing upwards, on a partially discarded, dead, frond hanging parallel the trunk. She oviposited a second time. On approaching closer in order to examine the eggs the female was possibly disturbed and she rapidly departed the area. All eggs were singletons. Indeed, eggs of both *Cephrenes* species on the many arecaceous host I have examined were always solitary. On pinnate-leaved palms (eg. *Archontophoenix* spp.) *Cephrenes* eggs were scattered over the pinnae often close to the rhachis, but in the palmate taxon *Zombia antillarum* many eggs were found concentrated (but not in batches) on the upper lamina surface close to the base (near the petiole attachment).

Discussion

Oviposition took place on the host in full sunshine. The female settled immediately, and there was no preliminary tactile contact with the foliage. Neither did she display a fluttery 'oviposition flight' distinguishable from her normal flight. No crawling or similar movement occurred after settling other than the curving of the abdominal and associated muscular action as part of egg extrusion. In all of these aspects her egg laying behaviour was very similar to that of *Parnara naso* (Hesperiinae) (Dunn 1993d) except she did not settle immediately as in *P. naso*, but flew about the frond for (seemingly) a few seconds longer before landing. Similarly, in many of these characters her behaviour differed from the Trapezitinae (Dunn 1993b).

Observations on territoriality and mate-locating behaviour in two members of the trapezitinae and in the hesperiine skipper *Suniana sunias* have been described (Dunn 1992, 1993a,e). Dunn (1993e) reported that males of *S. sunias* established territories on or near the foodplants; perch site selection by *Cephrenes* in forested areas is, in this respect, similar to that of *Suniana*. In woodlands in the Northern Territory, for example, males of *trichopepla* perched near the host plants (emergence sites) (Dunn pers. obs.), and Lyonns (1988) reported that in eastern Australian rainforests *augiades* also establishes territories near the larval hosts. In residential gardens about Brisbane both palmdart species will establish perch sites near nectar sources (adult foraging sites), in addition to emergence sites, but this behaviour also occurs in natural habitats where flowering shrubs are present. At Mount Warning National Park in NSW, for example, large numbers of male *augiades* regularly perch near exotic *Lantana camara* (Verbenaceae) which grows profusely adjacent the road and watercourses through rainforest. Although *Lantana* poses a considerable threat to native vegetation, both sexes of *augiades* as well as numerous other butterflies seek its nectar. Indeed, this nectar source promotes large concentrations of rainforest butterflies and, in so doing, serves as an important site for mate-location in many species.

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ON THE GRAPEVINE

Seen by Ian Faithful on 11 January 1994, a Cruiser, *Vindulo orsinoe* (Lep: Nymphalidae), an insect naturally restricted to coastal north Queensland, flying south or south-east in Cussonia Court at Melbourne University. At the time of sighting, about 3 pm, the air was warm and there was a moderate NW wind which could have helped the butterfly move the 1.5 km from the Melbourne Zoo Butterfly House, its most likely origin.

RECENT ARTICLES OF INTEREST

Compiled by Ian Faithfull and Ian Endersby

Crespi, B.J., 1992. **Behavioural ecology of Australian gall thrips (Insecta: Thysanoptera).** *Journal of Natural History* 26:769-809. Gall morphology, adult morphology, inquilines, behaviour, life cycles, sex ratios, *Cladothrips*, *Oncothrips*, *Onychothrips*, *Iotatubothrips*, *Thaumatothrips*, *Phallothrips*.

Flora and Fauna Guarantee, Action Statement No.46. Hemiphlebia Damselfly ***Hemimphlebia mirabilis***. Compiled by E.Birkin, B.Quin & A.Jelinek. Biology: T.New. Department of Conservation and Natural Resources, Victoria, June 1993. One of a series on rare and threatened organisms listed under the F & FG Act.

ABC Television, *Quantum*, 18 Aug. 1993. The film *Jurassic Park* envisages the recreation of dinosaurs by cloning DNA from blood in mosquitoes preserved in amber. While such possibilities are still a long way off, insect remains from real amber from the Cretaceous in the Dominican Republic have been used to examine the phylogenetic relationship of extinct termites, and to determine if *Mastotermes* is a "missing link" between the cockroaches and the termites. On the basis of such molecular palaeontology it has been concluded that the two orders have a common ancestor: one has not evolved from the other. Increasing automation of cloning techniques and computerisation of known DNA patterns is now enabling many phylogenetic classifications based solely on morphology to be revised.

Waldcock, J.M., 1991. **The colour forms of the Christmas spider** ***Gasteracantha minax*** **in south-western Australia.** *Western Australian Naturalist* 18(8):207-215. 4 forms described, illustrated.

Thompson, D.J., 1991. **Dragonflies from the western Kimberley region.** *Western Australian Naturalist* 18(9):197-200. 5 week visit April-May 1988, 32 spp. incl.14 damselflies. Notes on ecology and behaviour.

Berry, P., 1993. **From cow pat to frying pan: Australian Herring** ***(Arripes georgianus)*** **feed on an introduced dung beetle (Scarabaeidae).** *Western Australian Naturalist* 19(3):241-2. *Onthophagus taurus* blown over the ocean found in the stomachs of 33 of 63 herring near Yallingup. All fish caught in the late afternoon had eaten this dung beetle. One fish contained 8 beetles which were also found in large numbers in tide marks.

Turlings, C.J. *et al.*, 1993. **An elicitor in caterpillar oral secretions that induces corn seedlings to emit chemical signals attractive to parasitic wasps.** *Journal of Chemical Ecology* 19(3):411-425. A chemical constituent of the regurgitate of *Spodoptera exigua* (Noctuidae) larvae, several other species of caterpillars, and a grasshopper, causes the release of terpenes by *Zea mays* seedlings within hours. The regurgitate chemical is not related to the food source. The release of volatile terpenes appears to be a general response to insect attack which attracts the parasitoid wasps *Cotesia marginiventris* and *Microplitis croceipes*: "It is proposed that such chemicals serve multifunctional purposes that directly and indirectly protect plants against herbivorous arthropods and pathogens."

Lansberg, J., 1993. **Rural dieback and insect damage in remnants of native woodlands.** *Victorian Naturalist* 110:37.

Briggs, L., 1993. **Apiculture in box and ironbark forests.** *Victorian Naturalist* 110:38-44. An apiarists outline of the industry, its relationship with these forests and nature conservation. Regarding the impact of honeybees on reproductive success of Australian flora and fauna Briggs notes the Federal Council of the Australian Apiarists Association considers "early experiments, designed to investigate the possible impact of honey bees ... to be deficient in design and execution" but "unfortunately ... influential in forming negative attitudes towards honey bees". No comments however on the effects off honeybee nectar thieves on other insects.

Grey, P. & Barker, R., 1993. ***Cordyceps* or plant eats animal!** *Victorian Nat.* 110:98-107. Vegetable caterpillars, the result of the infection of insect larvae with the spores of the Ascomycete fungi *Cordyceps* spp.: hosts, life cycles, details of known Victorian species, photographs of 3 spp.

Webb, G.A., 1993. **Plant associations of some Australian jewel beetles (Coleoptera: Buprestidae: Agrilinae).** *Victarian Nat.* 110:160-162. Details on *Agrilus*, *Cisseis* and *Ethon*, adult and larval hosts; plus review of lit.

Hawkeswood, T.J., 1993. **Review of the biology and host plants of the Australian jewel beetle *Melobasis purpurascens* (Fabricius) (Coleoptera: Buprestidae).** *Sydney Basin Naturalist* 1:51-4.

Hawkeswood, T.J., 1993. **Notes on two species of *Astia* Koch (Arachnida: Salticidae) from Brisbane, Queensland.** *Sydney Basin Naturalist* 1:62.

LeBreton, M. & Vaarwerk, M., 1993. **Records of three *Apiomorpha*, Rubsaaman (Homoptera: Eriococcidae: Apiomorphinae) employing *Eucalyptus burgessiana* in the Blue Mountains, NSW.** *Sydney Basin Nat.* 1:77-8.

Hawkeswood, T.J., 1993. **Records of three butterflies feeding from the flowers of the Leichardt tree, *Nauclea arientalis* (L.) L. (Rubiaceae).** *Sydney Basin Nat.* 1:81-2. *Graphium sarpedon, Euplaea care, Tirumala hamata.*

LeBreton, M. & Hawkeswood, T.J., 1993. **A record of apparent wasp predation on two species of Buprestidae (Coleoptera) from north-eastern NSW.** *Sydney Basin Nat.* 1:85. *Stigmodera* in nest of unidentified wasp.

Hawkeswood, T.J., 1993. **Observations on the metallic leaf beetle, *Augamela pretiosa* Baly (Coleoptera: Chrysomelidae) in the Townsville area, Queensland.** *Sydney Basin Nat.* 1:91-3.

Hawkeswood, T.J., 1993. **Review of the biology and host fungi of the Australian fungus beetle *Episcaphula australis* (Boisduval) (Coleoptera: Erotylidae).** *Sydney Basin Nat.* 1:94-6. Main host a red bracket fungus *Palystichus cinnabarinus*.

Tolra, L., 1992. **$1.75m dieldrin payout.** *Weekly Times* 3 June, pp.1,3
Powell, T., 1992. **Payout helps ease chemical residue anxiety.** *W.T.*, 3 June,p.3

Tolra, L., 1992. Doubts over dieldrin payout. *The Age* 17 June, p.3
In Aug. 1987 US & Japanese inspectors discovered organochlorine pesticide residues in exported Australian beef. Hundreds of cattle properties were subsequently quarantined and the anger of farmers was directed to state Agric. Depts. for recommending use of the contaminants. The Victorian Dept. blamed illegal use of the products. By March 1988 22 Victorian properties were quarantined and an inquiry found the Dept. had been aware of the residue problems of organochlorines for 17 years but had done little to inform farmers. 51 dieldrin affected potato farmers shared in an out-of-court settlement with the Victorian Govt.

Two species of oecophorid moths (Mallee Months) have been reared from koala scats obtained from southern NSW. *CSIRO Div. Entomol. Report of Research 1991-1993.*

Hemiphlebia mirabilis Selys: Recovery from habitat destruction at Wilson's Promontory, Victoria, Australia, and implications for Conservation Management. T. R. New *Odonatologica* 22(4): 495-502 (1993).

Forthcoming Titles from CSIRO:

Australian Beetles J. F. Lawrence & E. B. Britton
Handbook of Australian Orthopteroid Insects D. C. F. Rentz

CALL FOR NOMINATIONS: J.C. 'ZOO' LE SOUËF MEMORIAL AWARD

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c/- 66 Wiltonvale Avenue
Hoppers Crossing, Vic. 3029

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